U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

DOE BUILDINGS PERFORMANCE DATABASE

Overview

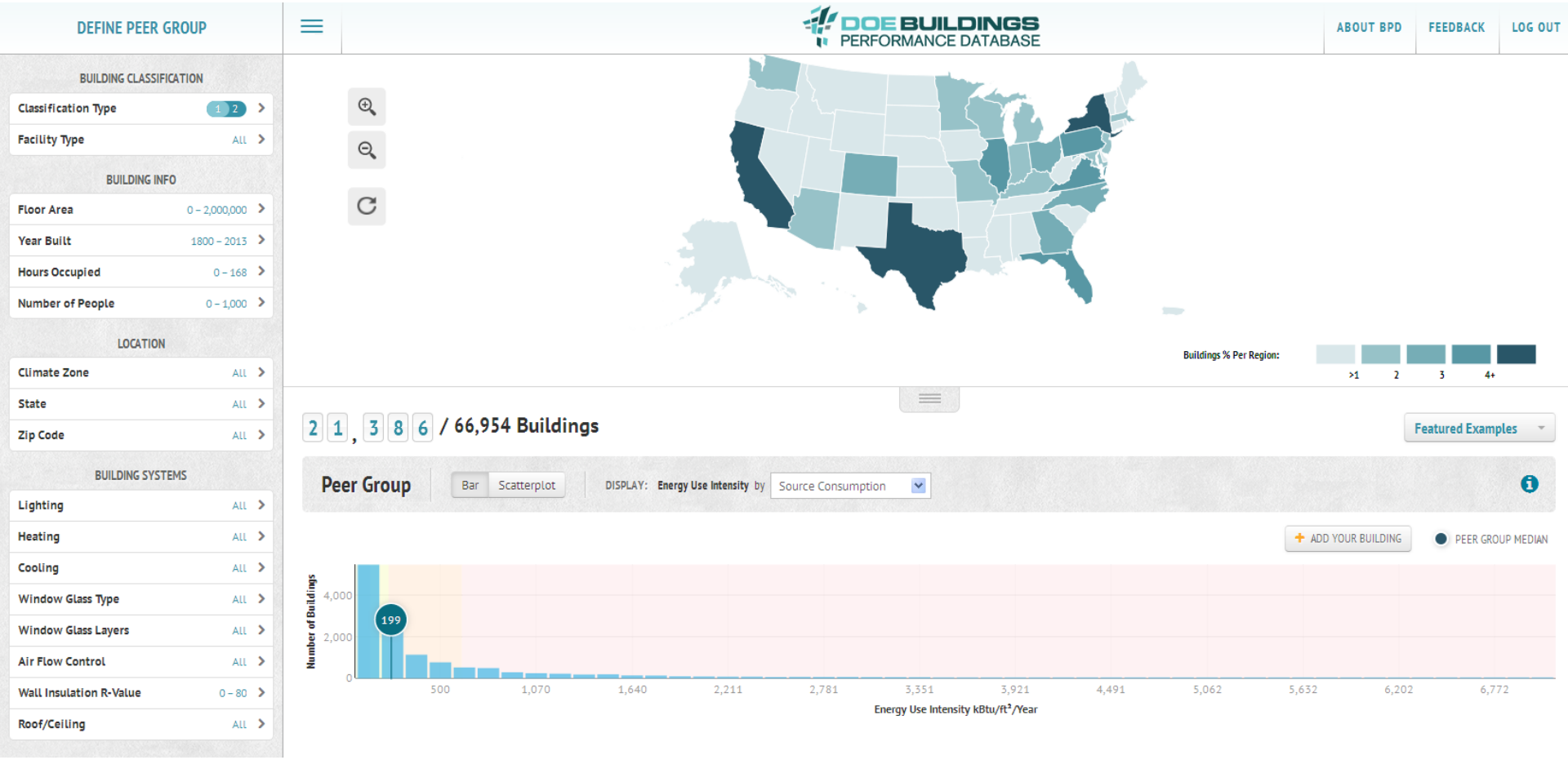
September 2013

Buildings.energy.gov/BPD

BuildingsPerformanceDatabase@ee.doe.gov

The Buildings Performance Database

- The BPD statistically analyzes trends in the energy performance and physical & operational characteristics of real commercial and residential buildings.



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BPD unlocks the power of building energy performance data.

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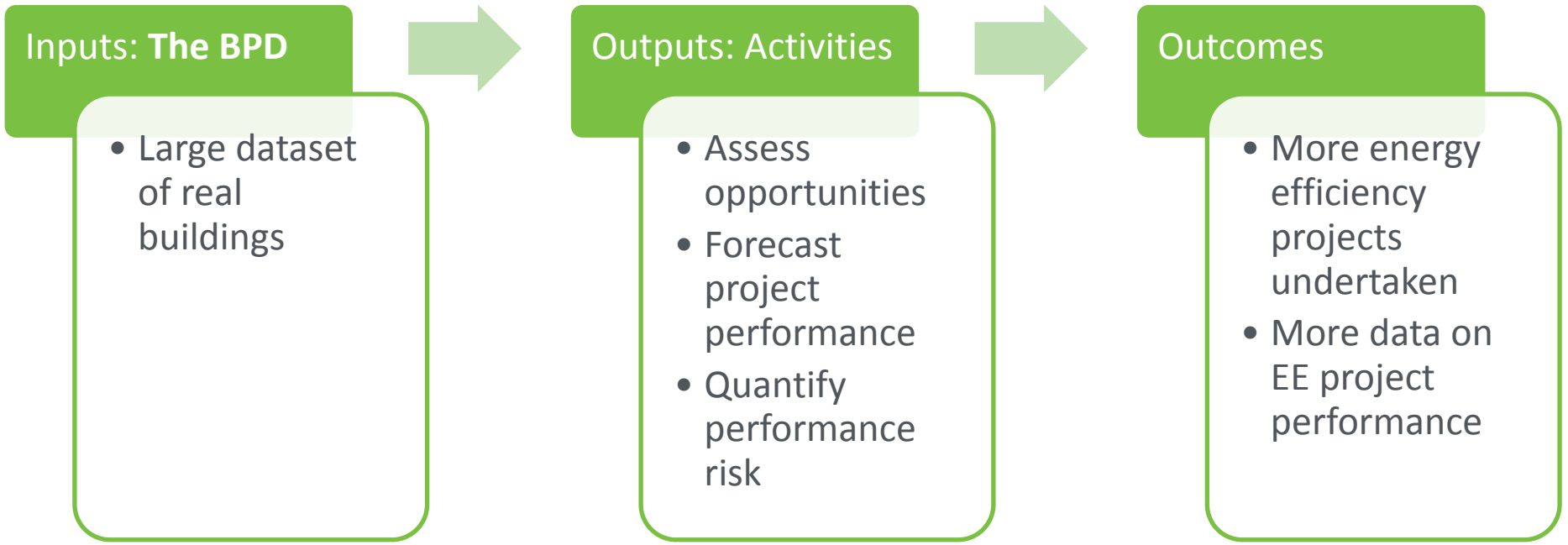

Design Principles

- The BPD contains *actual data* on existing buildings - not modeled data or anecdotal evidence.
- The BPD enables statistical analysis without revealing information about individual buildings.
- The BPD cleanses and validates data from many sources and translates it into a standard format.
- In addition to the BPD's analysis tools, third parties will be able to create applications using the database.

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The BPD aggregates data from many other tools

DOE BUILDINGS PERFORMANCE DATABASE
FUELING INVESTMENT IN ENERGY EFFICIENCY

Data Sources

- Basic Building Info
- Energy Consumption
- Audits
- Commissioning studies
- Operating characteristics
- Equipment & asset info
- Public records

Software Tools

Collect data and conduct diagnostic analysis about individual buildings

ENERGY STAR® PortfolioManager®

An energy management tool that tracks & assesses energy & water consumption in user's buildings.

DOE's Building Rating Tools

Includes the Home Energy Score & Commercial Building Energy Asset Score

Other Tools & Databases

Includes Building Management Tools, Energy Efficiency Program Administration Databases, CBECS and RECS, etc.

Aggregation Platform

Combine and analyze data from many sources

DOE BUILDINGS PERFORMANCE DATABASE

One publicly-accessible database of anonymous, empirical records.

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Current Data Sources for the BPD

- >70,000 buildings, with information from both public and private datasets.
- More datasets are being added regularly. There is no upper limit for the number of buildings the BPD can hold.

Public Sector

U.S. Energy Information Administration
U.S. General Services Administration
U.S. Environmental Protection Agency
New York City Dept. of Citywide Administrative Services
Pennsylvania Keystone HELP Home Energy Loan Program
San Francisco Department of the Environment
State of California Public Utilities Commission
State of California Energy Commission
University of Arizona
University of Dayton
District Department of the Environment: Washington, DC
Vermont Energy Investment Corporation
Virginia Beach City Public Schools

Private Sector

Brandywine Realty Trust
Connexion Asset Group
Kohl's
Liberty Property Trust
Lucid Design Group
Prudential
Related
Tishman Speyer
Transwestern
USAA

An iterative strategy for taking the BPD to scale

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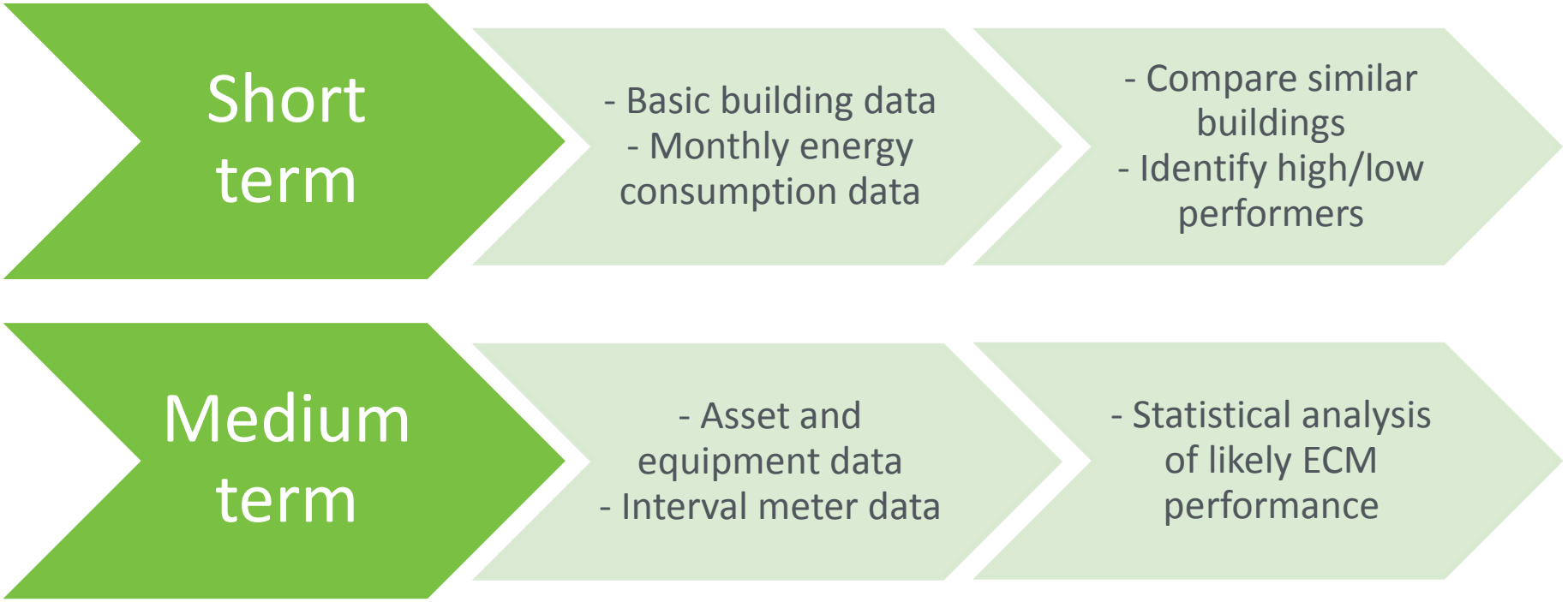
- The BPD demonstrates the value of aggregating the kind of data that is commonly collected today.
- As stakeholders begin to collect and contribute richer data, the BPD will support more advanced analysis.



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Peer Group Tool

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- **Use the Peer Group Tool to peruse the BPD, define peer groups, and analyze their performance.**

- **Filter the dataset** based on building type, location, floor area, age, occupancy, and system characteristics such as lighting and HVAC type.

- **Create graphs** of the selected dataset comparing:
  - Energy metrics such as: energy use intensity, source consumption, site consumption, electric consumption, or fuel consumption
  - Building characteristics such as: gross floor area, year built, and hours occupied
  - More variables will become available for analysis as the dataset grows

- **Enter information about a building** to see how it compares to the peer group

Peer Group Tool
Homes in Florida

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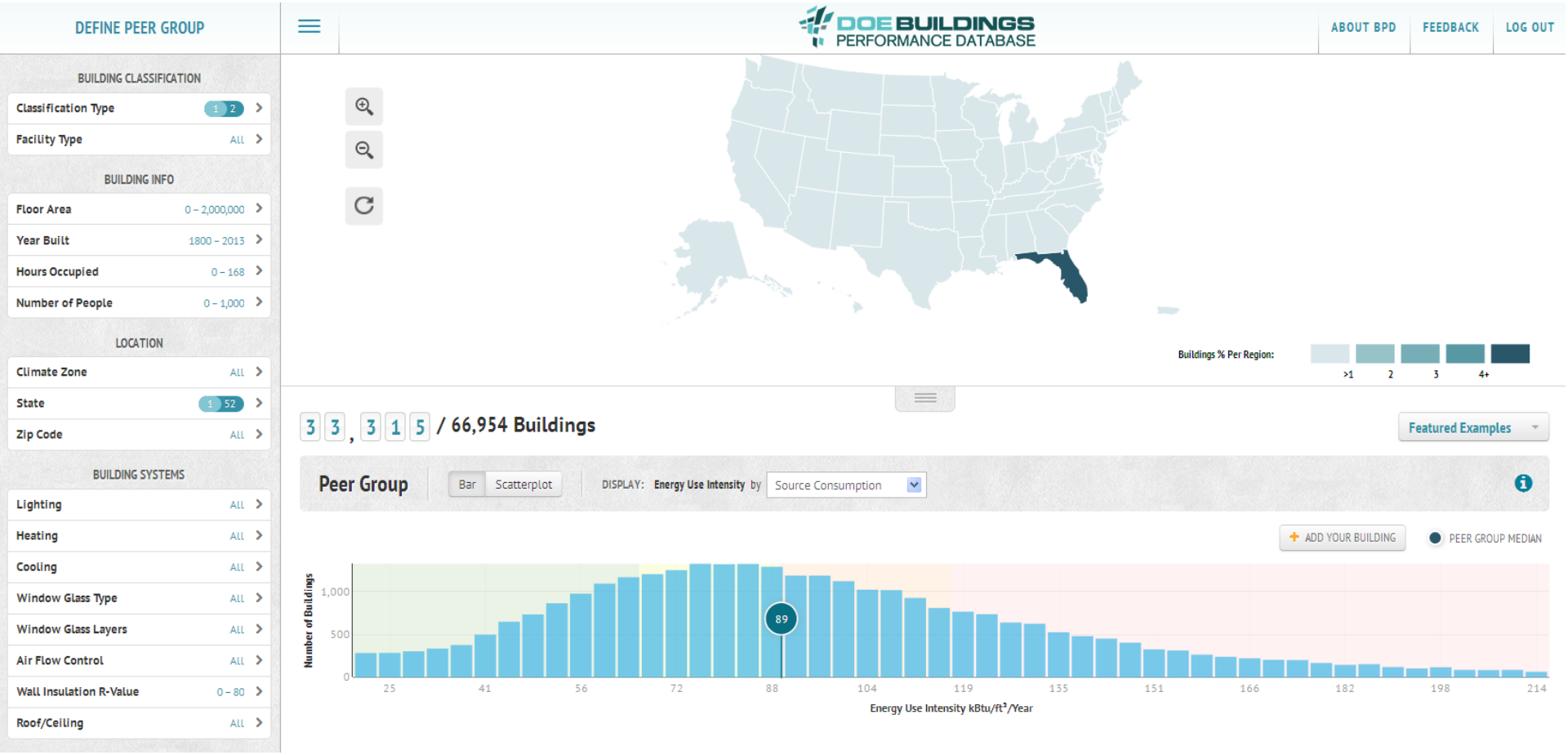
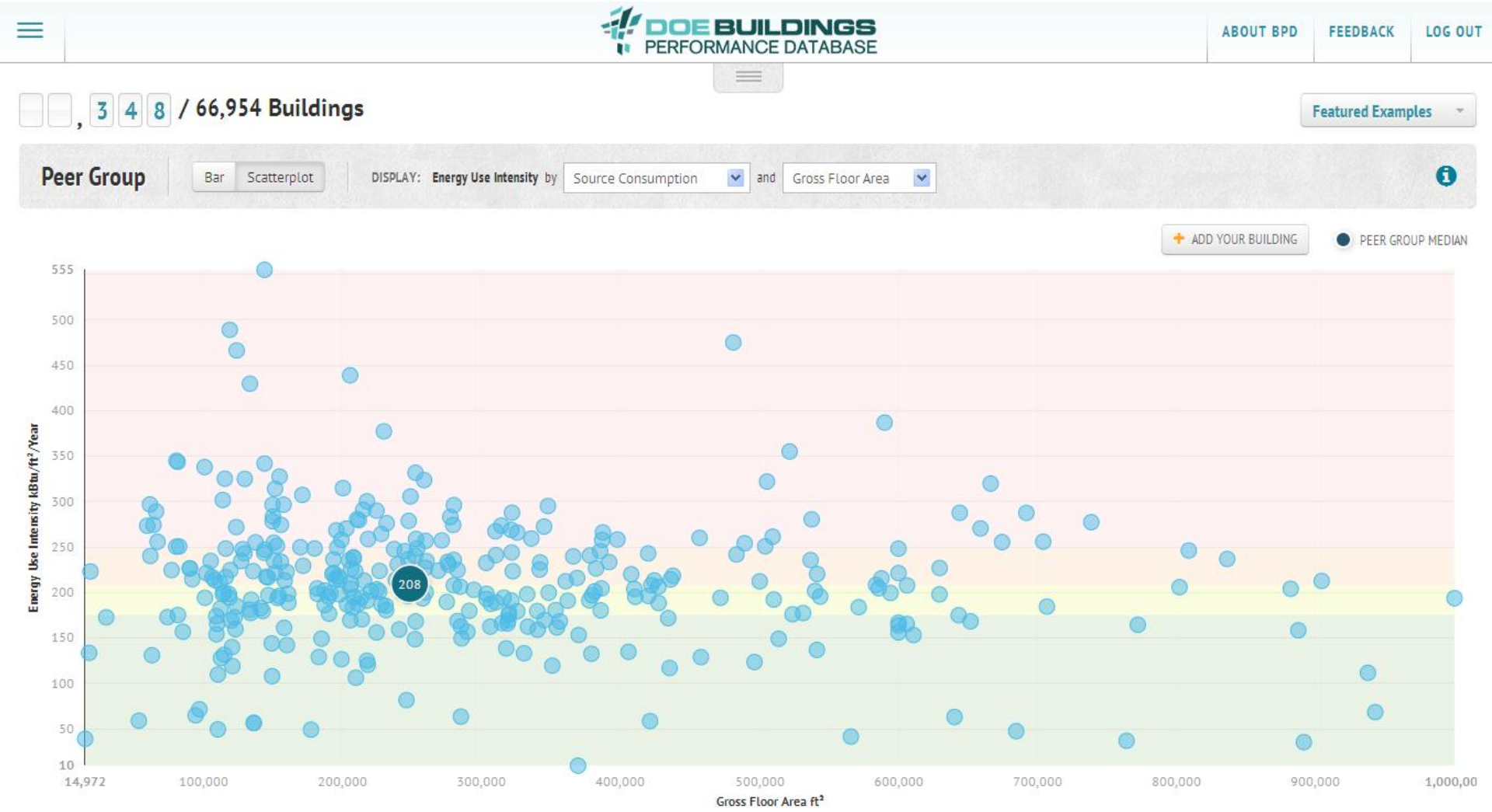
Florida Homes
Building Count by Source kBtu/SF/yr



Peer Group Tool
Washington DC Benchmarking Data

DOE BUILDINGS PERFORMANCE DATABASE

Office Buildings <1M SF, built since 1900
Source Consumption by Gross SF

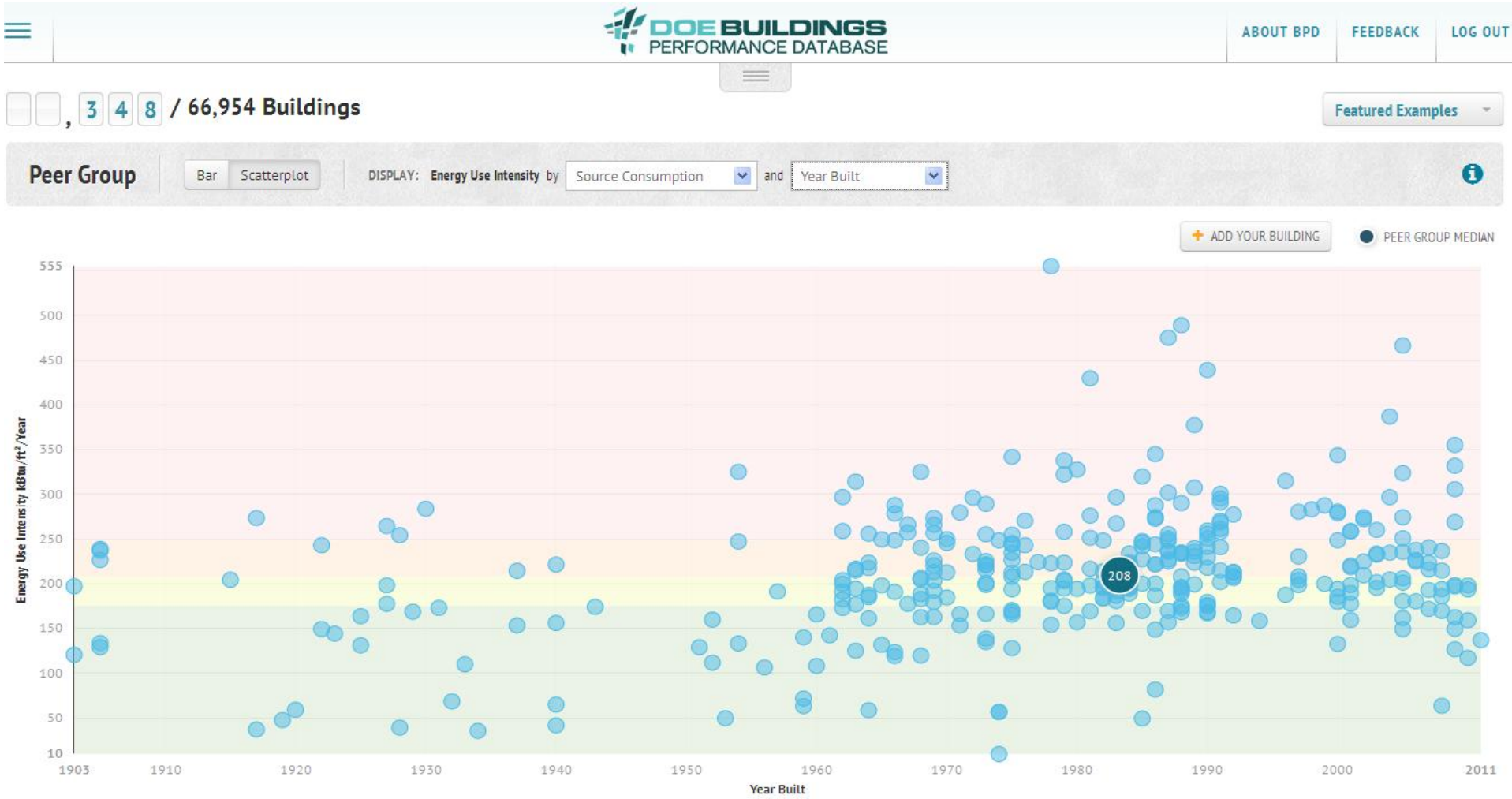


Peer Group Tool
Washington DC Benchmarking Data

DOE BUILDINGS PERFORMANCE DATABASE

Office Buildings <1M SF, built since 1900

Source Consumption by Year Built



Note: Does not yet include Federally owned buildings

Retrofit Analysis Tool

- **The Tool allows users to analyze the savings potential of specific energy efficiency measures for a peer group of buildings.**

- Results provide **forecasted energy savings** for individual measures
  - The graph shows the probability of achieving different levels of energy savings.

- Methodology:
  - The bar chart shows the **distribution of likely energy savings, based on one-to-one comparisons of buildings that have one technology to peers that have a different technology.** The horizontal axis shows the percent change in energy use, while the vertical axis shows the percentage of the one-to-one comparisons that resulted in that level of energy savings.
  - Note that the savings estimates currently exclude interactive effects between technologies. Moreover, it does not take into account the relative impact of other building characteristics that may be correlated. As the data in the BPD becomes more robust, users will be able to control for these variables.

Retrofit Analysis Tool
California Big Box Retail: Cooling Retrofit

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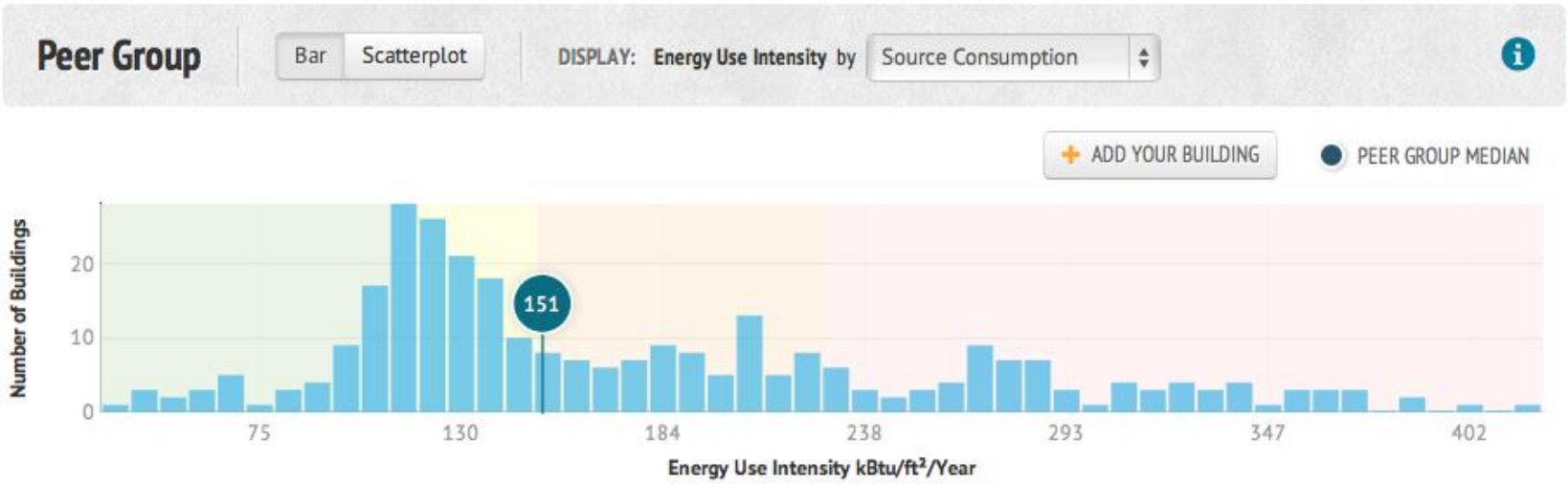
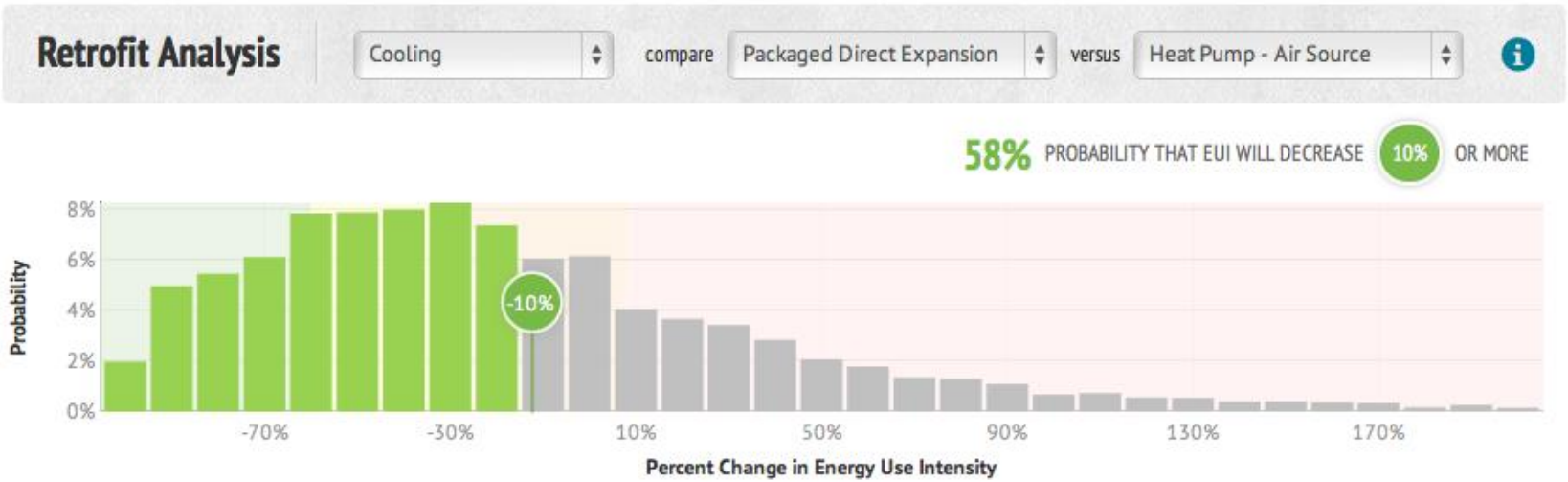
CA Retail Buildings >50,000 SF; N = 320

Compare Packaged Direct Expansion *to* Air Source Heat Pump





Retrofit Analysis Tool
California Office Buildings: Heating Retrofit

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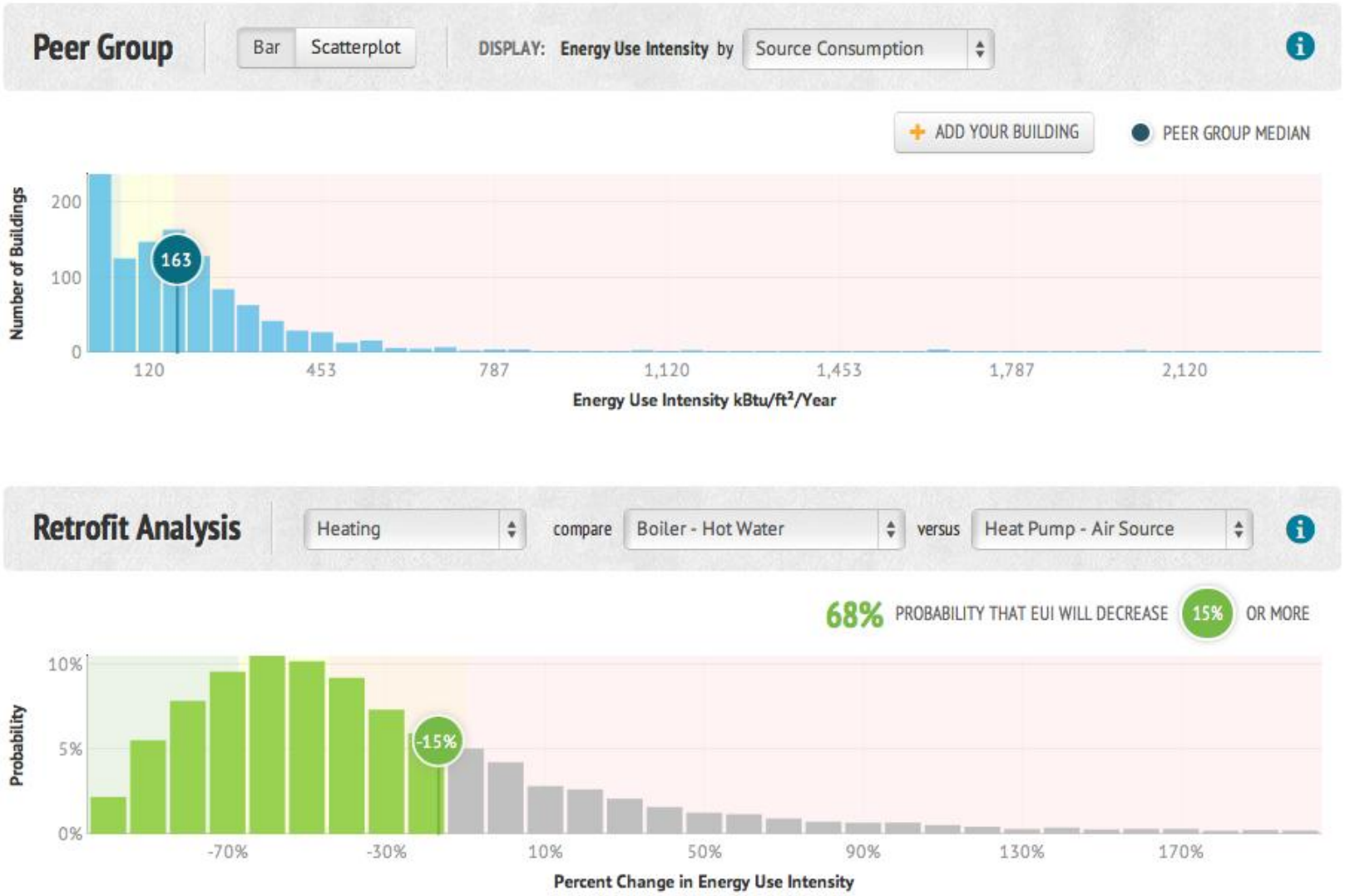
Office Buildings; N = 2,022

Compare Packaged Hot Water Boiler *to* Air Source Heat Pump



Value – Building Owners & Managers

DOE BUILDINGS PERFORMANCE DATABASE

Assess opportunities	• Identify high or low performing buildings, and identify improvements that will likely have a significant savings impact
Understand performance risk	• Analyze the range of likely returns from an investment
Evaluate investment performance	• Compare efficiency project performance to similar projects

Value – Government Agencies

DOE BUILDINGS PERFORMANCE DATABASE

Assess opportunities	• Identify high or low performing buildings, and identify improvements that will likely have a significant savings impact
Understand performance risk	• Analyze the range of likely returns from an investment
Evaluate investment performance	• Compare efficiency project performance to similar projects
Influence local real estate markets	• Enable public access to general statistical information about buildings, without sharing building-level information

Value –Energy Efficiency Programs

DOE BUILDINGS PERFORMANCE DATABASE

Help participants assess opportunities	• Help building owners, managers, and contractors identify improvements that will likely have a significant savings impact
Target program design	• Identify buildings and efficiency measures with the greatest savings potential
Support M&V	• Optimize M&V requirements based on measured savings uncertainty and persistence

Value – Financial Institutions

DOE BUILDINGS PERFORMANCE DATABASE

Assess opportunities	• Identify high or low performing buildings, and identify improvements that will likely have a significant savings impact
Increase confidence in returns	• Analyze actual building performance (as opposed to modeled or predicted performance)
Conduct performance risk analysis	• Quantitatively distinguish between expected returns and performance risk
Support portfolio-level investment strategy	• Diversify risk by investing in a range of buildings and measures

6,000 users since June 2013 launch

DOE BUILDINGS PERFORMANCE DATABASE

Building Owners & Managers	Contractors & Software Developers	Financial Institutions
Public Agencies	EE Program Administrators	Research Institutions

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Get Involved

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Check out the BPD: Buildings.energy.gov/BPD

- At: BuildingsPerformanceDatabase@ee.doe.gov

- The BPD staff can help you identify datasets that contain the minimum and optional fields.

- You can share your Portfolio Manager account, or transfer files via an FTP site or email.
- The BPD accepts all electronic file formats including .csv, .xls and .accdb.
- Include the words "PROPRIETARY DATA" in the file name or email body.

- The BPD team will reformat, cleanse and anonymize your data before entering it into the BPD.
- You may request a cleansed copy of your own dataset.

- The BPD team will let you know when your data has been uploaded!
- BPD data is stored under stringent privacy and security protocols.

Contact:

BuildingsPerformanceDatabase@ee.doe.gov

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BPD is seeking datasets that include:

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- Required Fields

✓ *Basic Building Characteristics*

- ❑ City, State, Zip Code
- ❑ Usage type (office, retail, home)
- ❑ Building floor area
- ❑ Year completed
- ❑ Electricity/fuel use for at least one year

- Optional Fields

✓ *Detailed Building Characteristics*

Operational information (Portfolio Manager data), such as:

- ❑ Types of activities and associated floor area
- ❑ Operating hours
- ❑ Number of occupants

Equipment & Asset information, such as:

- ❑ Lighting type and controls
- ❑ Air distribution configuration, controls, etc
- ❑ Heating and cooling equipment types & efficiencies
- ❑ Hot water equipment type & efficiency
- ❑ Wall, roof and window characteristics

BPD Data Privacy and Security

- **The BPD has clear use restrictions, and stringent privacy and security policies:**
  - Data can only be analyzed in aggregate through the BPD interface. The BPD analyses will never allow identification of specific buildings.
  - All the records contained in the Database are anonymous. All personally identifiable information, such as name, street address, etc. of buildings or individuals are removed from the records prior to entry.
  - Individual building records will not be released publicly. Any data that is properly marked as "proprietary data" is protected by law from release under the Freedom of Information Act.
  - The Database's security policies align with DOE policies and Information Security best-practices. The BPD employs Secure Sockets Layer (SSL) certificates with 2048-bit RSA encryption.
  - *DOE can provide a standard confidentiality statement to attach when providing your data for the BPD.*